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Rocky Flats Environmental Technology Site

January 26, 1999

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99-DOE-03508

Mr Joe Schieffelin, Unit Leader
Hazardous Waste Monitoring and Enforcement
Colorado Department of Public Health and the Environment
4300 Cherry Creek Drive South
Denver, Colorado 80222-1530

**ANNUAL REPORT OF TREATABILITY STUDIES FOR THE ROCKY FLATS ENVIRONMENTAL
TECHNOLOGY SITE - KSN-008-99**

Dear Mr Schieffelin

Pursuant to the requirements of the Colorado Hazardous Waste Regulations, 6 CCR 1007-3, Section 261 4 (f)(10), Kaiser-Hill Company, L L C (Kaiser-Hill) and the United States Department of Energy Rocky Flats Field Office (DOE, RFFO) are submitting the enclosed Annual Report of Treatability Studies for the Rocky Flats Environmental Technology Site (RFETS)

Due to an oversight that resulted from significant downsizing in the area of research and development and dramatically reduced treatability study activity, it was agreed after verbal discussion with members of your staff that we would include data for activities occurring in 1996, 1997 and 1998 in the 1998 Treatability Study Report The aforementioned data is incorporated in the enclosed report

Should you have any questions, please contact Bob Cathel of Kaiser-Hill at (303) 966-6880 or Dave Grosek of DOE, RFFO at (303) 966-3305

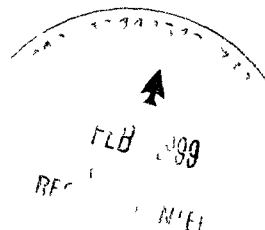
Bob April 1/26/99
Bob April, Group Lead Date
Regulatory Liaison
U S Department of Energy, RFFO

Karan North 1/26/99
Karan North, Division Manager Date
Environmental Systems & Stewardship
Kaiser-Hill Company, L L C

BLC wsi

Enclosure
As Stated

cc
D Grosek - DOE, RFFO
T Hopkins - RMRS
K Nell - RFCSS
B Wierzbicki - SSOC



ADMIN RECCRD 1/8
SW-SW-A-003183

ANNUAL REPORT – TREATABILITY STUDIES

In accordance with the requirements of the Colorado Hazardous Waste Regulations, 6 CCR 1007-3, Section 261 4 (f)(10), the following information is provided for treatability studies at the Rocky Flats Environmental Technology Site (RFETS), P O Box 928, Golden, Colorado 80402-0928 The EPA Identification Number for RFETS is CO7890010526

1 Estimate the number of studies and the amount of waste expected to be used in treatability studies during the calendar year 1999

There is currently one treatability study planned for 1999, stabilization of clarifier pond sludge. This study will consist of mixing approximately 500 grams of sludge with a mixture of fly ash and a phosphate bonding agent to determine if the resultant mixture meets applicable treatment standards.

2 Name, Address, and EPA Identification Number of the facility conducting the treatability studies

Supercritical Carbon Dioxide Extraction

Idaho National Engineering Lab

P O Box 1625

Idaho Falls, Idaho 83415

EPA Identification Number ID48900008952

Low Temperature Thermal Desorption

Clemson Technical Center

101 Technology Drive

Anderson, South Carolina 29625

EPA Identification Number SCD987588084

All Other Treatability Studies

Rocky Flats Environmental Technology Site

P O Box 464

Golden, Colorado, 80402-0464

EPA Identification Number CO7890010526

3 The types (by process) of treatability studies conducted during the calendar year

1996

- a) Macroencapsulation of non-radioactively contaminated leaded gloves
- b) Alkaline chlorination destruction of low level mixed excess chemical cyanides and sulfides
- c) Ultraviolet oxidation destruction of low level mixed excess organic chemicals
- d) Polymer encapsulation of low level mixed cadmium sludge (study initiated in CY95)
- e) Polyethylene microencapsulation of low level mixed bypass sludge (study initiated in CY95)
- f) Polyethylene microencapsulation of low level mixed fluidized bed incinerator ash (study initiated in CY95)
- g) Low temperature thermal desorption of low level mixed combustibles and absorbents (offsite study conducted at the Clemson Technical Center in Anderson, South Carolina)

1997

None

1998

- a) Ash Stabilization to meet Waste Isolation Pilot Plant Waste Acceptance Criteria
- b) Hydrolysis of contaminated calcium metal

4 The total quantity of waste in storage each day

1996

- a) Macroencapsulation of non-radioactively contaminated leaded gloves

Date	Waste Added (kg)	Waste Treated (kg)	Waste in Storage (kg)
02/22/96	79	79	0
08/28/96	14		14
09/16/96		14	0

- b) Alkaline chlorination destruction of low level mixed excess chemical cyanides and sulfides

Date	Waste Added (g)	Waste Treated (g)	Waste in Storage (g)
01/02/96	4400		4400
01/22/96		3	4397
01/23/96		12	4385
02/07/96		122	4263
02/08/96		470	3793
02/15/96		103	3690
02/16/96		107	3583
02/19/96		229	3354
02/26/96		10	3344
02/29/96		102	3242
03/16/96		101	3141
12/19/96	-3141		0

- c) Ultraviolet oxidation destruction of low level mixed excess organic chemicals

Date	Waste Added (g)	Waste Treated (g)	Waste in Storage (g)
01/11/96	574		574
04/17/96		106	468
04/23/96		12	456
05/14/96		132	324
05/29/96		113	211
06/11/96		201	10

06/21/96		10	0
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d) Polymer encapsulation of low level mixed cadmium sludge (study initiated in CY95)

Date	Waste Added (g)	Waste Treated (g)	Waste in Storage (g)
Carryover			533
03/28/96	15		548
09/11/96		548	0

e) Polyethylene microencapsulation of low level mixed bypass sludge (study initiated in CY95)

Date	Waste Added (kg)	Waste Treated (kg)	Waste in Storage (kg)
Carryover			18 52
02/06/96	0 47		18 99
02/14/96		1 95	17 04
02/15/96		3 85	13 19
03/28/96		5 42	7 77
04/02/96		7 77	0

f) Polyethylene microencapsulation of low level mixed fluidized bed incinerator ash (study initiated in CY95)

Date	Waste Added (kg)	Waste Treated (kg)	Waste in Storage (kg)
Carryover			21 09
01/30/96		2 15	18 94
02/01/96		4 43	14 51
02/06/96		5 44	9 07
02/07/96		3 95	5 12
02/08/96		5 12	0

g) Low temperature thermal desorption of low level mixed combustibles and absorbents

Waste from the Rocky Flats inventory was shipped offsite to be treated under Treatability Study Exemption provisions at the Clemson Technical Center in calendar year 1995. The waste consisted of 59 kg of used absorbents and 96 kg of wet combustibles. The studies took place from December 13, 1995 through March 4, 1996. Since the studies were conducted offsite, the records are maintained and reported by the South Carolina facility.

1997

None

1998**a) Ash Stabilization to meet Waste Isolation Pilot Plant Waste Acceptance Criteria**

Date	Waste Added (g)	Waste Treated (g)	Waste in Storage (g)
3/26/98	653		653
4/1/98		60	593
4/20/98		55	538
9/23/98			0

b) Hydrolysis of contaminated calcium metal

Date	Waste Added (g)	Waste Treated (g)	Waste in Storage (g)
8/12/98	818		818
9/15/98		40	778
9/21/98		32	746
9/23/98		23	723
9/24/98		91	632
9/29/98		31	601
9/30/98		17	584
10/6/98		93	491
10/7/98		155	336
10/8/98		155	181
10/9/98		62	119
10/13/98		119	0

5 The quantity and type of waste subjected to treatability studies (including dates)**1996****a) Macroencapsulation of non-radioactively contaminated leaded gloves**

This study was initiated on February 22, 1996, with receipt of 79 kg of non-radioactively contaminated leaded gloves. These gloves either had expired shelf lives or had been used for capability testing. The first test was performed that same day by macroencapsulating all 79 kg in thermoset epoxy. On August 28, 1996, an additional 14 kg of non-radioactively contaminated leaded gloves were delivered to the study area. This batch of waste was successfully encapsulated in polyethylene on September 16, 1996.

b) Alkaline chlorination destruction of low level mixed excess chemical cyanides and sulfides

The study was initiated on January 2, 1996, with receipt of 4400 grams of 13 different reactive cyanides and sulfides in 16 containers. On January 22, 1996, solubility tests were initiated with approximately 0.5 gram quantities each of calcium sulfide, zinc sulfide, cerium monosulfide, lanthanum monosulfide, and lanthanum sulfide. Solubility testing continued into January 23, 1996, with 12 grams of sodium sulfide. Destruction tests started on February 7, 1996, with 122 grams of sodium sulfide (total quantity received). On February 8, all 470 grams of ammonium sulfide were destroyed. 439 grams of ammonium thiocyanate were destroyed between

February 15 and 19, 1996 (total quantity received) Between February 26 and March 16, 1996, a total of 213 grams of sodium nitroferricyanide was subjected to destruction testing The remainder of the chemicals received were determined to be insoluble and/or too stable and not amenable to this process

c) Ultraviolet oxidation destruction of low level mixed excess organic chemicals

The study was initiated on January 11, 1996, with receipt of 574 grams of 2 different reactive organics Destruction tests of nitromethane were started on April 17, 1996, and continued through June 11, 1996 A total of 564 grams of nitromethane were destroyed during the study On June 21, 1996, 10 grams of 1,1-dimethoxyethane were added to the system and subsequently destroyed

d) Polymer encapsulation of low level mixed cadmium sludge

533 grams of cadmium stearate were carried over from the treatability study initiated in calendar year 1995 On March 28, 1996, 15 grams of a returned lab sample were added The total of 548 grams was encapsulated in thermoset epoxy on September 11, 1996

e) Polyethylene microencapsulation of low level mixed bypass sludge

18 52 kg of bypass sludge waste were carried over from the treatability study initiated in calendar year 1995 On February 6, 1996, TCLP samples totaling 0 47 kg were added to the study Starting on February 14, 1996, and extending through April 2, 1996, four test runs were made to maximize waste loading in the final encapsulated waste form

f) Polyethylene microencapsulation of low level mixed fluidized bed incinerator ash

21 09 kg of fluidized bed incinerator ash were carried over from the treatability study initiated in calendar year 1995 Starting on January 30, 1996, and extending through February 8, 1996, five test runs were accomplished to optimize operating conditions and parameters for the polymer process These included mixing characteristics, feed methods, waste loading, etc

g) Low temperature thermal desorption of low level mixed combustibles and absorbents

Treatment of 59 kg of used absorbents and 95 kg of wet combustibles, shipped from the Rocky Flats inventory, was demonstrated at the Clemson Technical Center beginning on December 13, 1995, and continuing through March 4, 1996 Treatment records are maintained at the South Carolina facility

1997

None

1998

a) Ash Stabilization to meet Waste Isolation Pilot Plant Waste Acceptance Criteria

This study was originally identified to be performed in Building 707 with prototypical development in Building 701 As a result of the prototypical development phase, the study was simplified and reassigned to the effort in Building 559 653 grams of ash waste (IDC 420)

entered the study on 3/26/98 60.1 grams was treated on 4/1/98 The treated material was subjected to analysis on 4/6/98 An additional 55.1 grams was treated and analyzed on 4/20/98 The results of the analysis were reviewed and the evaluation was concluded in June of 1998

b) Hydrolysis of contaminated calcium metal

This study was focused on developing a process for treating waste calcium metal in a glovebox environment 818 grams of waste (IDC 333) entered the study on 8/12/98 Treatment was performed between 9/15/98 and 10/13/98 The study was concluded with the issuance of laboratory procedure L-4216-A on 10/27/98

6 Final disposition of residues and unused samples from each treatability study

1996

a) Macroencapsulation of non-radioactively contaminated leaded gloves

No unused samples resulted from this study After treatment, the encapsulated samples were visually inspected, tested, and shipped to permitted storage The first sample (79 kg) was shipped to storage on July 16, 1996 The second sample (14 kg) was moved to a 90-Day Accumulation Area on October 17, 1996, and subsequently to permitted storage

b) Alkaline chlorination destruction of low level mixed excess chemical cyanides and sulfides

The treated samples that met disposal standards were cemented and disposed as straight low level contaminated waste All unused samples, and those treated samples that did not meet standards, were transferred to a 90-Day Accumulation Area on December 19, 1996, and subsequently shipped back to permitted storage

c) Ultraviolet oxidation destruction of low level mixed excess organic chemicals

No unused samples resulted from this study After laboratory analysis indicated that the solution in the UV oxidation system was no longer reactive, the solution was disposed to the Building 371 Liquid Waste Treatment Facility on August 12, 1996

d) Polymer encapsulation of low level mixed cadmium sludge

No unused samples resulted from this study The final encapsulated sample was archived in the treatability study area until February 14, 1997 On that date the sample was transferred to a 90-Day Accumulation Area and subsequently to permitted storage

e) Polyethylene microencapsulation of low level mixed bypass sludge

No unused samples resulted from this study The encapsulated samples were archived in the treatability study area until February 14, 1997 On that date the samples were transferred to a 90-Day Accumulation Area and subsequently to permitted storage

f) Polyethylene microencapsulation of low level mixed fluidized bed incinerator ash

No unused samples resulted from this study. The encapsulated samples were archived in the treatability study area until February 14, 1997. On that date the samples were transferred to a 90-Day Accumulation Area and subsequently to permitted storage.

g) Low temperature thermal desorption of low level mixed combustibles and absorbents

No unused samples resulted from this study. All residuals were returned to Rocky Flats for disposition. The residuals are currently in permitted storage awaiting final disposition.

1997

None

1998

a) Ash Stabilization to meet Waste Isolation Pilot Plant Waste Acceptance Criteria

Excess sample material was returned to RCRA Unit 371.1 on 9/23/98. After analysis was completed, treatment residues were managed as newly generated waste in accordance with the Colorado Hazardous Waste Regulations, 6 CCR 1007-3, Part 262.34 and ultimately managed in permitted treatment and storage units at RFETS.

b) Hydrolysis of contaminated calcium metal

All of the sample material was consumed during the study. The resultant aqueous liquid waste (approximately 15 liters) is being managed as laboratory process waste and will ultimately be treated in a permitted aqueous waste treatment facility at RFETS. Approximately 60 grams of solid, non-reactive waste was also generated during the study. This waste was disposed as non-mixed waste after being subjected to water reactivity testing.

7 Summary of spills or releases of waste materials to the environment.

None to report